

REMARKS

Foreign Priority

The acknowledgement, in the Office Action, of a claim for foreign priority under 35 U.S.C. § 119(a)-(d), and that the certified copy of the priority document has been received, is noted with appreciation.

Status Of Application

Claims 1-14 are pending in the application. By this Amendment, claim 15 has been added. The status of claims 1-14 is as follows:

Claims 4, 5, 9-11 and 14 are withdrawn from consideration;

Claims 6-8 are rejected under 35 U.S.C. § 112, first paragraph;

Claims 1-3, 12 and 13 are rejected under 35 U.S.C § 112, second paragraph;

Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) over Japanese Publication 11-278287 (A) to Oya (Oya) in view of U.S. Patent 4,907,626 to Mori (Mori);

Claim 3 is rejected under 35 U.S.C. § 103(a) over Oya in view of Mori, and further in view of U.S. Patent 4,576,846 to Noel (Noel); and

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) over Oya in view of U.S. Patent 1,983,584 to Urschel (Urschel).

Drawings

To date, no Notice of Draftsperson's Patent Drawing Review has been received. Applicants respectfully request receipt of this document when it becomes available. Please note that the original drawings filed in the patent application are "formal" drawings.

Claim Amendments

Claims 1, 2, 3, 6 and 12-14 have been amended to improve the form thereof. These changes are not necessitated by the prior art, are unrelated to the patentability of the invention over the prior art, and do not introduce any new matter.

35 U.S.C. § 112 Rejections

Claims 6-8

The rejection of claims 6-8 under the first paragraph of 35 U.S.C. § 112 is respectfully traversed based on the following.

Claim 6 has been amended to improve the form thereof. Specifically, “said plate is one plate acquired by welding a first plate for a rack teeth area for said row of rack teeth is to be formed and a second plate for an area except it” has been amended to “said plate comprises a first plate for a rack teeth area provided where said row of rack teeth is to be formed and a second plate for an area other than the rack teeth area.” An exemplary embodiment of this feature of claim 6 is depicted in Figs. 18a and 18b and described in paragraph 39 of the present specification.

Claims 7 and 8 depend from claim 6 and as such incorporate the changes to claim 6. Therefore, the statements above are equally applicable to claims 7 and 8.

Accordingly, it is respectfully requested that the rejection of claims 6-8 under the first paragraph of 35 U.S.C. § 112, be reconsidered and withdrawn.

Claims 1-3, 12, and 13

The rejection of claims 1-3, 12 and 13 under the second paragraph of 35 U.S.C. § 112 is respectfully traversed based on the following.

Claim 1 and dependent claims 2 and 3 have been amended to improve the inconsistencies with antecedency pointed out in the Office Action.

Claim 12 has been amended to provide for better clarity. In particular, “it” in line 6 has been amended to now state “said first area”. Claim 13 depends from claim 12 and also incorporates this change.

Accordingly, it is respectfully requested that the rejection of claims 1-3, 12 and 13 under the second paragraph of 35 U.S.C. § 112 be reconsidered and withdrawn.

35 U.S.C. § 103(a) Rejection

Claims 1 and 2

The rejection of claims 1 and 2 under 35 U.S.C. § 103(a), over Oya in view of Mori is respectfully traversed based on the following.

Enclosed for the convenience of the Examiner is a computer-generated translation of Oya.

Claim 1 recites the following:

A hollow rack shaft which is formed cylindrically by bending a substantially rectangular plate so that parallel two sides of the rectangular plate are joined, wherein in a part of a surface of the rectangular plate a row of rack teeth is formed along a direction of an axis of the rectangular plate, and wherein:

said sides of the rectangular plate that are joined each has complementary profiles composed of a continuation of a convex portion and a concave portion so that the sides are engaged when they are joined.

The Patent Office describes the burden for supporting an obviousness rejection as follows:

35 U.S.C. 103 authorizes a rejection where, to meet the claim, it is necessary to modify a single reference or to combine it with one or more other references. After indicating that the rejection is under 35 U.S.C. 103, the examiner should set forth in the Office action: (A) the relevant teachings of the prior art relied upon,...(B) the difference or differences in the claim over the applied reference(s), (C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and **(D) an explanation why one of ordinary skill in the art at the time**

the invention was made would have been motivated to make the proposed modification.¹

The MPEP further comments on the substance of a statement alleging an obviousness rejection:

A statement that modifications of the prior art to meet the claimed invention would have been “ ‘well within the ordinary skill of the art at the time the claimed invention was made’ ” because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references.²

Further, the Federal Circuit has stated that “[o]bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, **absent some teaching suggestion or incentive supporting the combination.**”³ The Federal Circuit has coupled this provision with the additional requirement that the suggestion or motivation exist before the date of invention. The Federal Circuit has stated:

[absent explanation of] the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of [the] invention to make the combination, this court infers that the examiner selected these references with the assistance of hindsight. This court forbids the use of hindsight in the selection of references that comprise the case of obviousness.⁴

As further stated by the Federal Circuit:

The genius of invention is often a combination of known elements which in hindsight seems preordained. To prevent hindsight invalidation of patent claims, the law requires some “teaching, suggestion or reason” to combine cited references... When the art in question is relatively simple,...the opportunity to judge by hindsight is particularly

¹ MPEP §706.02(j) (8th ed.)(emphasis added).

² MPEP §2143.01 (8th ed.).

³ See *In re Geiger*, 815 F.2d 686, 2 USPQ 2d 1276, 1278 (Fed. Cir. 1987)(emphasis added).

⁴ *In re Rouffet*, 149 F.3d 1350, 47 USPQ 2d 1453, 1458 (Fed. Cir. 1998).

tempting. Consequently, the tests of whether to combine references need to be applied rigorously.⁵

Regarding claim 1, the Office Action states that Oya discloses a hollow rack shaft in accordance with claim 1, except for sides of a rectangular plate having complimentary profiles composed of a continuation of a convex portion and a concave portion so that the sides are engaged when they are joined. The Office Action also states Mori renders obvious a cylindrical structure formed by bending a rectangular plate having complementary profiles composed of convex and concave portions.

Regarding the proposed combination of Oya and Mori, however, the Office Action merely alleges that “it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus described in Oya to include complimentary profiles of convex and concave profiles for the purpose of securing the rack together.” As pointed out above, the MPEP expressly sets forth that this type of statement is not sufficient to establish a *prima facie* case of obviousness, as it provides no objective reason to combine the teachings of the references, Oya and Mori. No further mention is made as to why one skilled in the art would be motivated to make the proposed combination.

Further, Oya discloses a steering rack shaft which is welded at an abutting surface 12. *See* Fig. 5 of Oya. Mori, on the other hand, discloses a wrapped bush with end portions having recesses and projections, which engage when the end portions are joined at the joints. *See* Fig. 5 of Mori. Thus, Mori is not even concerned with an automotive rack shaft. This is significant since a rack shaft for an automobile requires specific considerations as compared to a bush.

A rack shaft for an automobile is, in general, relatively long in comparison with its diameter and the conditions of the portions formed into rack teeth and round portions when a long plate is formed into a tube by bending in a width direction. During a steering operation of an automobile, a tensile stress and a shearing stress occur on the area of the

⁵ *McGinley v. Franklin Sports Inc.*, 262 F.3d 1339, 20 USPQ 2d 1001, 1008 (Fed. Cir. 2001)(citing *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573, 1579, 42 USPQ 2d 1378, 1383 (Fed. Cir. 1997))(emphasis added).

side with the butted line of the hollow rack shaft. The tensile stress is a force that acts to separate the butted sides from each other, and the shearing stress is a force that acts to move the butted sides in opposite longitudinal directions. Thus, the area where the edges are butted together would be the weakest portion of the hollow rack shaft if the sides were not welded according to conventional wisdom.

According to the present invention, the complimentary profiles force the deviation in a normal position by engaging mutually when being bent, and prevent the butt line from opening and moving aside during a steering operation. Thus, the butt portion is strengthened without the need for welding.

Oya and Mori fail to address the solution of the particular problem of a hollow rack shaft with un-welded butted sides. Further, neither reference discloses the use of complimentary profiles at a joint in a hollow rack shaft. That is, although Oya discloses a rack shafting, it only discloses a weld joint at what appears to be a straight line butt joint. *See* Fig. 1 and Fig. 5 of Oya. Mori is not even concerned with automotive rack shafts. In addition, both Oya and Mori fail to suggest any desirability or necessity for a rack shaft with a joint as claimed in claim 1.

Therefore, since there is no motivation for the modification of the Oya device according to the teachings of Mori, the proposed combination of Oya and Mori cannot render obvious claim 1, or claim 2 which depends from claim 1.

Accordingly, it is respectfully requested that the rejection of claims 1 and 2 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Claim 3

The rejection of claim 3 under 35 U.S.C. § 103(a) over Oya in view of Mori, and further in view of Noel, is respectfully traversed based on the following.

Claim 3 depends from claim 1. The Office Action alleges that claim 3 is rendered obvious by the combination of Oya, Mori, and Noel. However, regardless of whether Noel discloses the additional requirements of claim 3, Noel also fails to disclose or suggest a hollow rack shaft as required by claim 1, whether it is taken separately or in combination with the other cited references. Noel also does not provide the requisite suggestion or motivation that would lead one of ordinary skill in the art to combine the teachings of Oya with the teachings of Mori.

Moreover, with regard to the additional requirements of claim 3, it should first be pointed out that the word “caulk” in the specification of the present application relates to connecting metal members, for example, by plastically deforming the parts thereof using spire tools (e.g., chisel, punch, stamp, etc.). With that in mind, it is clear that Noel, which relates to an insulating tube or plate of plastic foam (a completely different field of art from the field of the present invention), fails to disclose or suggest caulking convex and concave portions of a hollow rack shaft.

Therefore, for the reasons discussed above, the proposed combination of Oya, Mori and Noel cannot render claim 3 obvious.

Accordingly, it is respectfully requested that the rejection of claim 3 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Claim 12 and 13

The rejection of claims 12 and 13 under 35 U.S.C. § 103(a) over Oya in view of Urschel is respectfully traversed based on the following.

Claim 12 recites the following:

A hollow rack shaft which is formed cylindrically by bending a plate so that two sides of the plate are joined, wherein in a part of a surface of the plate a row of rack teeth is formed along a direction of an axis of the plate, and wherein:

said rack shaft is provided with a first area and second areas on both sides of said first area;

wherein in said first area, the row of rack teeth and a semi-cylindrical part on a reverse side of the row of rack teeth are formed; and

in said second areas, a complete cylindrical part is formed and at least one of the second areas has a diameter different from a diameter of the semi-cylindrical part in said first area.

The Office Action states that Oya discloses a hollow rack shaft but fails to disclose that the rack shaft is provided with a first area and second areas on both sides of the first area, wherein at least one of the second areas has a diameter different from the diameter of the semi-cylindrical part in the first area. The Office Action further states that Urschel discloses a hollow shaft that is provided with a first area and a second area on both sides of the first area and in the second areas, a complete cylindrical part is formed and at least one of the second areas has a diameter different from the diameter of the cylindrical part in the first area.

However, the Office Action provides no motivation for one skilled in the art to make the proposed combination of the Oya device and the Urschel device. As mentioned above, the MPEP expressly sets forth that merely stating that a combination “would have been obvious to one of ordinary skill in the art” is not sufficient to establish a *prima facie* case of obviousness, as it provides no objective reason to combine the teachings of the references, Oya and Urschel. No further mention is made in the Office Action as to why one skilled in the art would be motivated to make the proposed combination.

Further, Oya discloses a rack shaft of a single diameter throughout its length, without any suggestion or reason to have differing diameters at the area where the rack teeth are provided and the rest of the rack shaft. Urschel, on the other hand, discloses a process for shaping steel tubes to various shapes. Thus, Urschel is completely unrelated to Oya and to the present invention, as Urschel relates to a process in which an original material is a cylindrically formed steel tube rather than a plate formed into a cylindrical shape by bending, thus having a seam to be concerned with.

Thus, neither of these references discloses or suggests a rack shaft with differing diameters at an area where rack teeth are provided and the rest of the rack shaft. Also, there exists no requisite suggestion to combine or modify these references. Therefore, for all of the reasons discussed above, the proposed combination of Oya and Urschel cannot render obvious claim 12, or claim 13 which depends from claim 12.

Accordingly, it is respectfully requested that the rejection of claims 12 and 13 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment does not increase the number of independent claims but increases the total number of claims from fourteen to fifteen without presenting any multiple dependency claims. Accordingly, because no new independent claims were added and because the total number of claims does not exceed twenty no fee based on the number or type of claims is currently due. However, if a fee, other than the issue fee, is due, please charge this fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.

Any fee required by this document other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

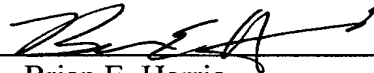
If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

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Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The following is a marked-up version of the changes to the claims which are being made in the attached response to the Office Action dated November 15, 2002.

IN THE CLAIMS:

Claim 15 has been added.

1. (Once Amended) A hollow rack shaft which is formed cylindrically by bending a substantially rectangular plate so that [the] parallel two sides of the rectangular plate are [joined and] joined, wherein in a part of [the] a surface of the rectangular plate [which] a row of rack teeth is formed along a direction of [the] an axis of the rectangular plate [is formed], and wherein:

said [respective] sides of the rectangular plate that are joined each has [have] complementary profiles composed of [the] a continuation of a convex portion and a concave portion so that the sides are engaged when they are joined.

2. (Once Amended) A hollow rack shaft according to Claim 1, wherein:
[the] a width of a part having [the] a largest width of said convex portion is larger than [the] a width of a part having [the] a smallest width of said concave [portion; and hereby,] such that said [two] sides are prevented from being detached.

3. (Once Amended) A hollow rack shaft according to Claim 1, wherein:
said convex portion and said concave portion mutually opposite are [caulked; and hereby,] caulked such that mutual gap is removed.

6. (Once Amended) A hollow rack shaft which is formed cylindrically by bending a substantially rectangular plate so that [the] parallel two sides of the rectangular plate are [joined and] joined, wherein in a part of [the] a surface of the rectangular plate

[which] a row of rack teeth is formed along a direction of [the] an axis of the rectangular plate [is formed], and wherein:

said plate [is one plate acquired by welding] comprises a first plate for a rack teeth area [for] provided where said row of rack teeth is to be formed and a second plate for an area [except it] other than the rack teeth area.

12. (Once Amended) A hollow rack shaft which is formed cylindrically by bending a plate so that [the] two sides of the plate are [joined] joined, wherein [and] in a part of [the] a surface of the plate [which] a row of rack teeth is formed along a direction of [the] an axis of the plate [is formed], and wherein:

said rack shaft is provided with a first area and second areas on both sides of [it] said first area;

wherein in said first area, the row of rack teeth and a semi-cylindrical part on [the] a reverse side of the row of rack teeth are formed; and

in said [two] second areas, a complete cylindrical part is formed and at least one of the second areas has a diameter different from [the] a diameter of the semi-cylindrical part in said first area.

13. (Once Amended) A hollow rack shaft according to Claim 12, wherein:

[the] a diameter of at least one of said second areas is smaller than [the] a diameter of said first area.

14. (Once Amended) A method of manufacturing a hollow rack shaft which is [provide] provided with a first area and a second area on both sides of it, in which in said first area, a row of rack teeth and a semi-cylindrical part on the reverse side are formed and in which in said two second areas, a complete cylindrical part is formed and at least one of the second areas has a diameter different from the diameter of the semi-cylindrical part in said first area, wherein:

a plate provided with a part with first width having width corresponding to the first area for said row of rack teeth to be formed and a part with second width corresponding to

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said second area and having narrower width than said part with the first width is plastically deformed cylindrically.